

What is claimed is:

1. (Amended) A film forming method for forming a metal silicate film on a substrate by a CVD process using a gas of metal alkoxide and a gas of silicon hydride, the method  
5 comprising:

a step of accommodating the substrate in a process chamber;

a step of heating the substrate in the process chamber  
10 to a temperature higher than or equal to a temperature at which the metal alkoxide is decomposed into metal hydroxide and a specific intermediate but lower than a self-decomposition temperature of the silicon hydride; and

a gas introduction step of introducing the gas of the metal alkoxide and the gas of the silicon hydride into the  
15 process chamber through respective introduction passages separated from each other,

wherein the gas introduction step is performed in a state where one of the introduction passages for introducing  
20 the gas of the metal alkoxide has a temperature lower than a self-decomposition temperature of the metal alkoxide.

2. The method of claim 1, wherein the gas of the metal alkoxide has a tertiary butoxyl radical as a ligand thereof.

25

3. The method of claim 2, wherein the intermediate is

isobutylene.

4. The method of claim 2, wherein the metal alkoxide is HTB.

5

5. The method of claim 4, wherein the temperature of the substrate in the step of forming the film is higher than or equal to 350 °C.

6. The method of claim 1, wherein the silicon hydride is disilane.

5 7. The method of claim 6, wherein the temperature of the substrate in the step of forming the film is lower than or equal to 450 °C.

8. (Canceled)

10

9. (Amended) A film forming apparatus for forming a metal silicate film on a substrate by a CVD process using a gas of metal alkoxide and a gas of silicon hydride, the apparatus comprising:

15 a process chamber for accommodating therein a substrate;

a first heater for heating the substrate in the process chamber;

20 a shower head for separately introducing the gas of the metal alkoxide and the gas of the silicon hydride into the process chamber;

a second heater for heating the shower head to a temperature lower than a self-decomposition temperature of the metal alkoxide; and

25 a controller for controlling the first heater such that a temperature of the substrate is adjusted to be higher

than or equal to a temperature at which the metal alkoxide is decomposed into metal hydroxide and a specific intermediate but lower than a self-decomposition temperature of the silicon hydride.

5

10. The apparatus of claim 9, wherein the metal alkoxide has a tertiary butoxyl radical as a ligand thereof.

10 11. The apparatus of claim 10, wherein the intermediate is isobutylene.

12. The apparatus of claim 10, wherein the metal alkoxide is HTB.

15 13. The apparatus of claim 12, wherein the temperature controller controls the temperature of the substrate when forming the film to be higher than or equal to 350 °C.

14. The apparatus of claim 9, wherein the silicon hydride is disilane.

15. The apparatus of claim 14, wherein the temperature  
5 controller controls the temperature of the substrate when forming the film to be lower than or equal to 450 °C.

16. (Canceled)

10 17. (Canceled)

18. (Canceled)

19. (Amended) A method for manufacturing a semiconductor device, comprising the steps of:

5           forming a silicon oxide film on a substrate;

          forming a metal silicate film on the silicon oxide film by a CVD process using a gas of metal alkoxide and a gas of silicon hydride; and

          forming a gate electrode on the metal silicate film,

10          wherein the step of forming the metal silicate film includes:

          a substep of accommodating the substrate on which the silicon oxide film is formed in a process chamber;

          a substep of heating the substrate in the process  
15   chamber to a temperature higher than or equal to a temperature at which the metal alkoxide is decomposed into metal hydroxide and a specific intermediate but lower than a self-decomposition temperature of the silicon hydride; and

          a gas introduction substep of introducing the gas of  
20   the metal alkoxide and the gas of the silicon hydride into the process chamber through respective introduction passages separated from each other,

          wherein the gas introduction substep is performed in a state where one of the introduction passages for introducing  
25   the gas of the metal alkoxide has a temperature lower than a self-decomposition temperature of the metal alkoxide.

20. The manufacturing method of claim 19, wherein the step

of forming the silicon oxide film is performed by oxidizing a surface of the silicon substrate with UV-excited oxygen radicals.